



## FIBER REINFORCED ROD

*This application is a continuation-in-part of United States Application, Serial No. 09/544,257, filed April 6, 2000, which is still pending.*

rod.

The term "rod" as used herein is intended to include bars and rods which are hollow, that is tubing. The outside surface is preferably but not necessarily of circular cross-section. The rods can be of any length including elements which are relatively short so that they are sometimes referred to as "bolts".

### BACKGROUND OF THE INVENTION

The use of fiber reinforced plastics (FRP) rods in construction, marine, mining and others has been increasing for years. This is because FRP has many benefits, such as non-(chemical or saltwater) corroding, non-metallic (or non-magnetic) and non-conductive, about twice to three times tensile strength and 1/4 weight of steel reinforcing rod, a coefficient of thermal expansion more compatible with concrete or rock than steel rod. Most of the bars are often produced by pultrusion process and have a linear or uniform profile. Conventional pultrusion process involves drawing a bundle of reinforcing material (e.g., fibers or fiber filaments) from a source thereof, wetting the fibers and impregnating them (preferably with a thermosettable polymer resin) by passing the reinforcing material through a resin bath in an open tank, pulling the resin-wetted and impregnated bundle through a shaping die to align the fiber bundle and to manipulate it into the proper cross-sectional configuration, and curing the resin in a mold while maintaining tension on the filaments. Because the fibers progress